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#### **Tammera**

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# (54) REACTOR BED VESSEL AND SUPPORT ASSEMBLY

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See application file for complete search history.

#### (56) References Cited

#### U.S. PATENT DOCUMENTS

1,005,933 A	10/1911	Brown		
1,416,849 A	5/1922	Loop		
2,505,851 A	5/1950	Wobker et al.		
2,669,946 A	2/1954	Peyton		
2,955,987 A *	10/1960	MacKay B01J 8/008		
		196/46		
3,099,538 A	7/1963	Kronig et al.		
(Continued)				

#### FOREIGN PATENT DOCUMENTS

FR	2450626 A1	10/1980
WO	2014081545 A1	5/2014

### OTHER PUBLICATIONS

PCT Application No. PCT/US2014/061308, Communication from International Searching Authority, PCT Form PCT/ISA/210, dated Feb. 24, 2015, 12 pages.

(Continued)

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#### (57) ABSTRACT

Vessel and support beam assembly includes a vessel having a cylindrical wall defining an interior chamber having a generally circular shape of diameter D in plan view, and a support assembly disposed within the interior chamber. The support assembly includes an inner hub defining an open central region, and a plurality of spokes extending radially from the inner hub. Each spoke is aligned radially with the cylindrical wall of the vessel and joined thereto. At least one open outer region is defined between circumferentially adjacent spokes.

### 19 Claims, 7 Drawing Sheets

